RF Tests of TESLA shape single cells

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Lower quench gradient of four 9-cell AES cavities [1] prompted an investigation of manufacturing steps. Six single cell cavities have been manufactured using the same batch of niobium sheets [2] as those used in 9-cell manufacturing. It is worth noting that the e-beam welding equipment for the single cell cavities was different than the 9-cell cavities. All five cavities were BCP processed and tested at Cornell University Facility. Table 1 lists the cavity material removal and their performance results.

Table 1:

Number	Maximum gradient [MV/m]	FE onset [MV/m]	BCP [μm]	Notes
TE1AES001	27.8	26.9	112	limited by Q-slope
TE1AES002	17.0	7.8	116	limited by FE
TE1AES003	27.7	No x-ray	117	limited by Q-slope
TE1AES004	25.2	21.9	107	limited by Q-slope and FE
TE1AES005	26.7	No x-ray	104	limited by Q-slope
TE1AES006				

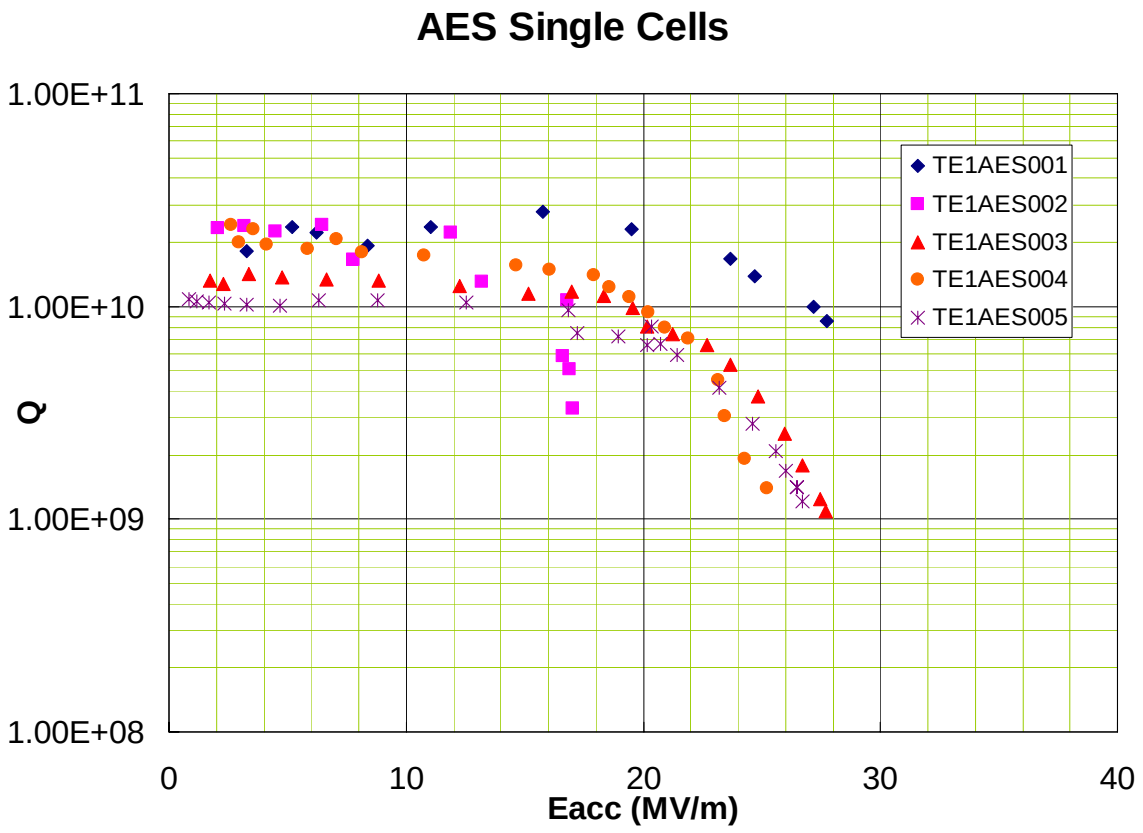

Figure 1: Q vs. accelerating gradient for 5 AES single cell cavities; Helium pressure was below 19 Torr for cavity 1 and 2, 25 Torr for cavity 3 and 5, 10 Torr for cavity 4.

The Q vs. Eacc was plotted in Figure 1. TE1AES001 and TE1AES002 were baked by heat lamp briefly.

It was concluded the cavities performed well as expected for BCP process and the gradient was beyond the quench gradient seen in the 9-cell cavities [1]. The quality of manufacturing for these single cell cavities was determined to be mostly excellent.

Acknowledgement

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[1] R. L. Geng et al, Latest Results of ILC High-Gradient R&D 9-cell Cavities at JLAB, Proceedings of 13th Workshop on RF Superconductivity at Peking University, Beijing, China, 2007.
[2] M. Battistoni et al, Fermilab Technote FNAL-TD-06-010, 2006